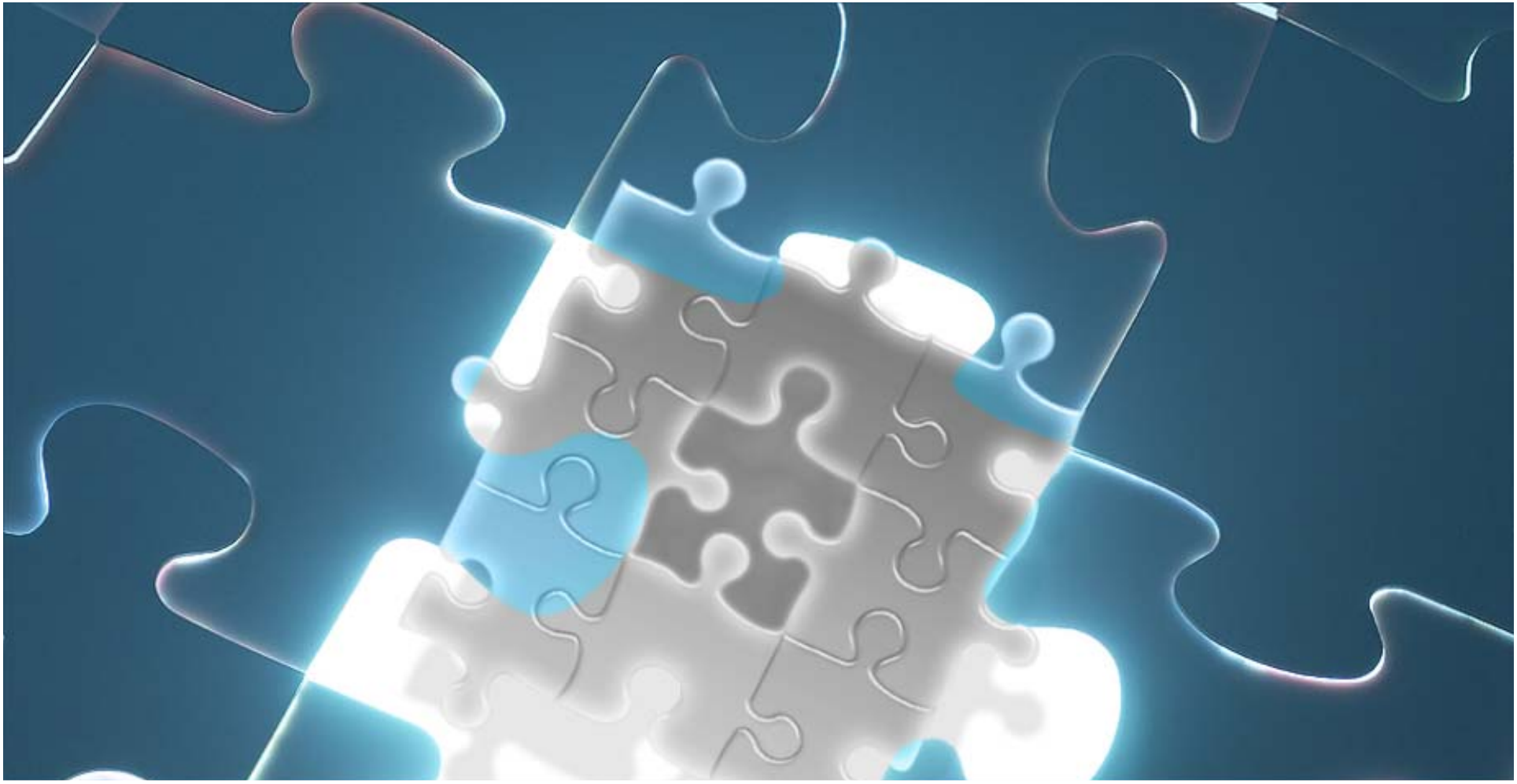

Gone in Sixty Seconds: Examining Motor Vehicle Theft in Philadelphia

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National Institute of Justice (NIJ)
Eighth Annual Crime Mapping Research Conference
September 7-10, 2005
Savannah, GA, USA


LOCK YOUR CAR!!
OR IT MAY BE
GONE
IN SIXTY SECONDS !!!

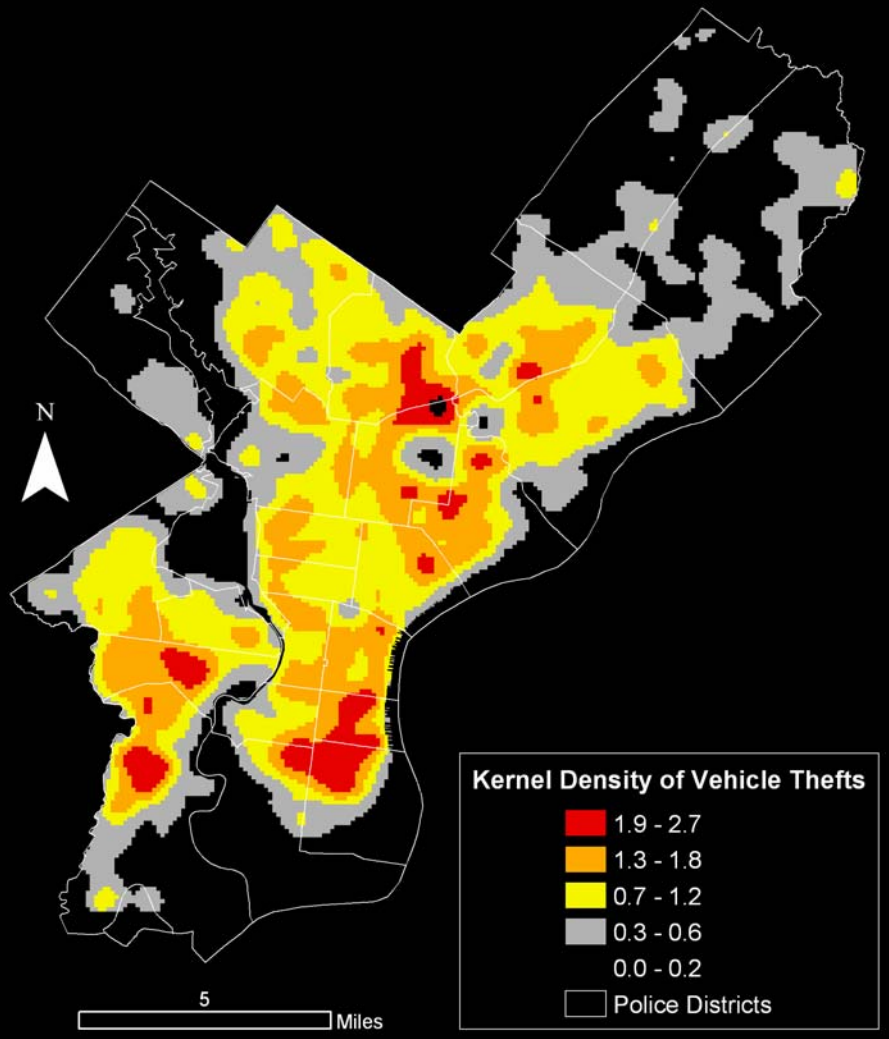
Introduction

- Acknowledgments
- Nature of Crime in 2003
  - Vehicle Theft in U.S. [Sources: F.B.I., NICB]
    - N=1.26 million (one every 25 secs.)
  - Vehicle Theft in PA [Source: PA State Police]
    - N=31,395 (one every 17 mins.)
  - Vehicle Theft in Phila. [Source: Phila. Police Dept.]
    - N=12,410 (one every 45 mins.)
- Direct and Indirect Costs
  - Economic
  - Personal Security
  - Criminal Justice

Research Overview

- The Data
  - Reported Stolen Vehicles in Philadelphia
    - 01 January 2003 to 31 December 2003
    - N = 12,410
    - Level of Aggregation is Census Tract (N = 381)
      - Mean = 32.5, S.D. = 21.4
    - Frequencies
      - Mean = 1,034 per month (September highest)
      - Mean = 34 per day (Mondays highest)
      - Mean = 1.4 per hour (8:00 AM highest)
  - 2000 U.S. Census

Kernel Density Surface of Stolen Vehicles in Philadelphia*



***The smoothed variation of the density of vehicle thefts in a fixed interval radius of 1,000 ft. around each of a 200-grid squares overlay.**

The Problem

- Previous research on vehicle theft
  - Social Disorganization
    - *Shaw and McKay (1942)*
    - Hope (1987), Liddy (1987), Messner and Blau (1987), Clarke and Harris (1992), Bellair (1997), Copes (1998)
  - Routine Activities
    - *Cohen and Felson (1979)*
    - Felson & Cohen (1981), Brantingham, Brantingham, Wong (1991), Flemming et al. (1994), Rengert (1997), Henry (2000), Plouffe (2003), Clarke & Goldstein (2003)
  - Combined
    - *Miethe and Meier (1994), Smith (2000)*
    - Rice and Smith (2002)*

The Research Question

- How does the choice of analytic technique affect which combination of social disorganization and routine activities variables best explains the variation of motor vehicle theft in Philadelphia?

The Research Methodology

- Dependent variable
  - Reported motor vehicle theft
- Social disorganization associated variables
  - 4 Indexes
- Routine activities associated variables
  - 4 Nodes
- Regression models
  - Ordinary Least Squares (OLS)
  - Spatial Lag
  - Geographically Weighted Regression (GWR)

Variables Associated with Social Disorganization

Four Indexes

Racial Heterogeneity	Proportion of population White, Black, Hispanic, Asian/Pacific Islander
Socioeconomic Status	Household income, House value, College degree or higher, Above the poverty line
Residential Stability	Percent owner occupied households, Occupied households for 5 years plus
Family Supervision	Population age 6 to 13, 14 to 19, Single person families with children under 18, Single person with or without child, Single parents in poverty with children, Population age 50 and older multiplied by -1

Variables Associated with Routine Activities (RAT)

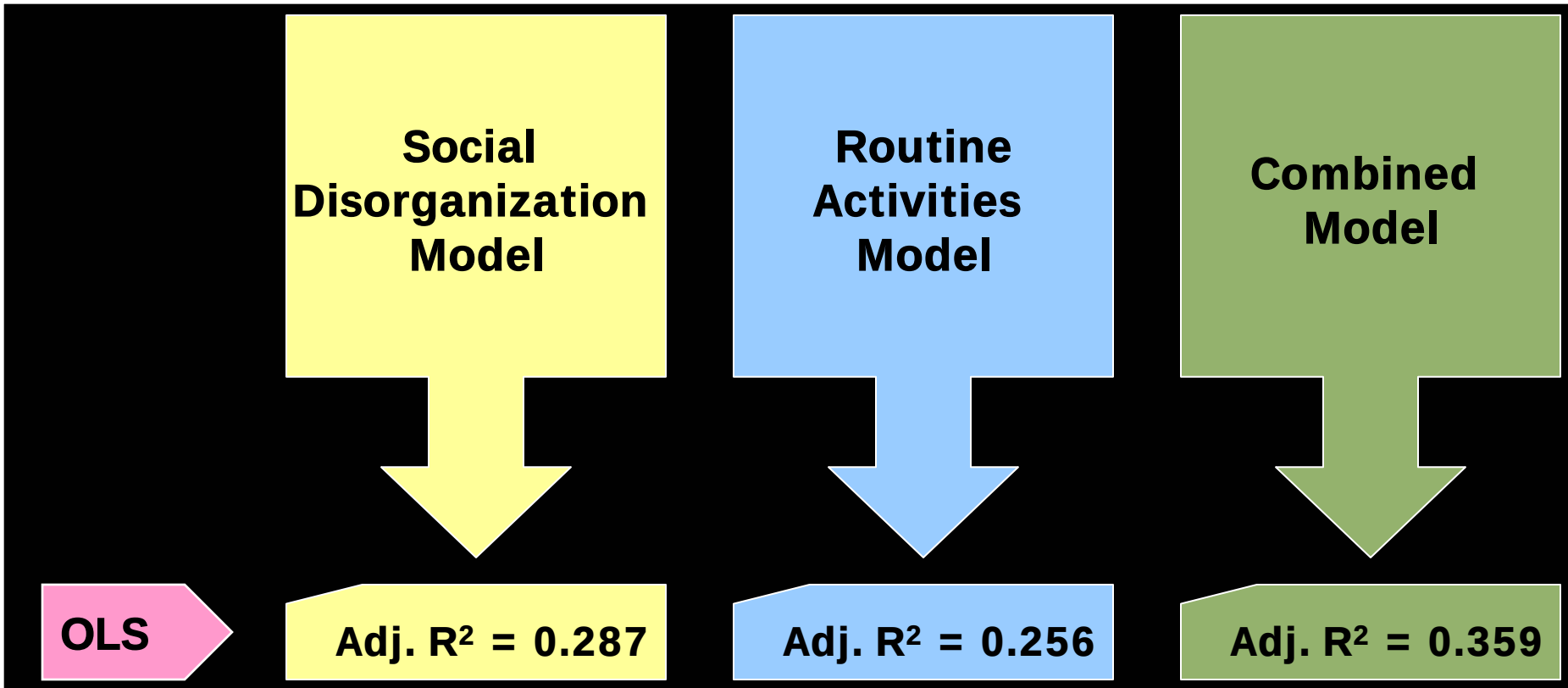

Liquor Establishments (N = 2,301)


ATMs (N = 442)

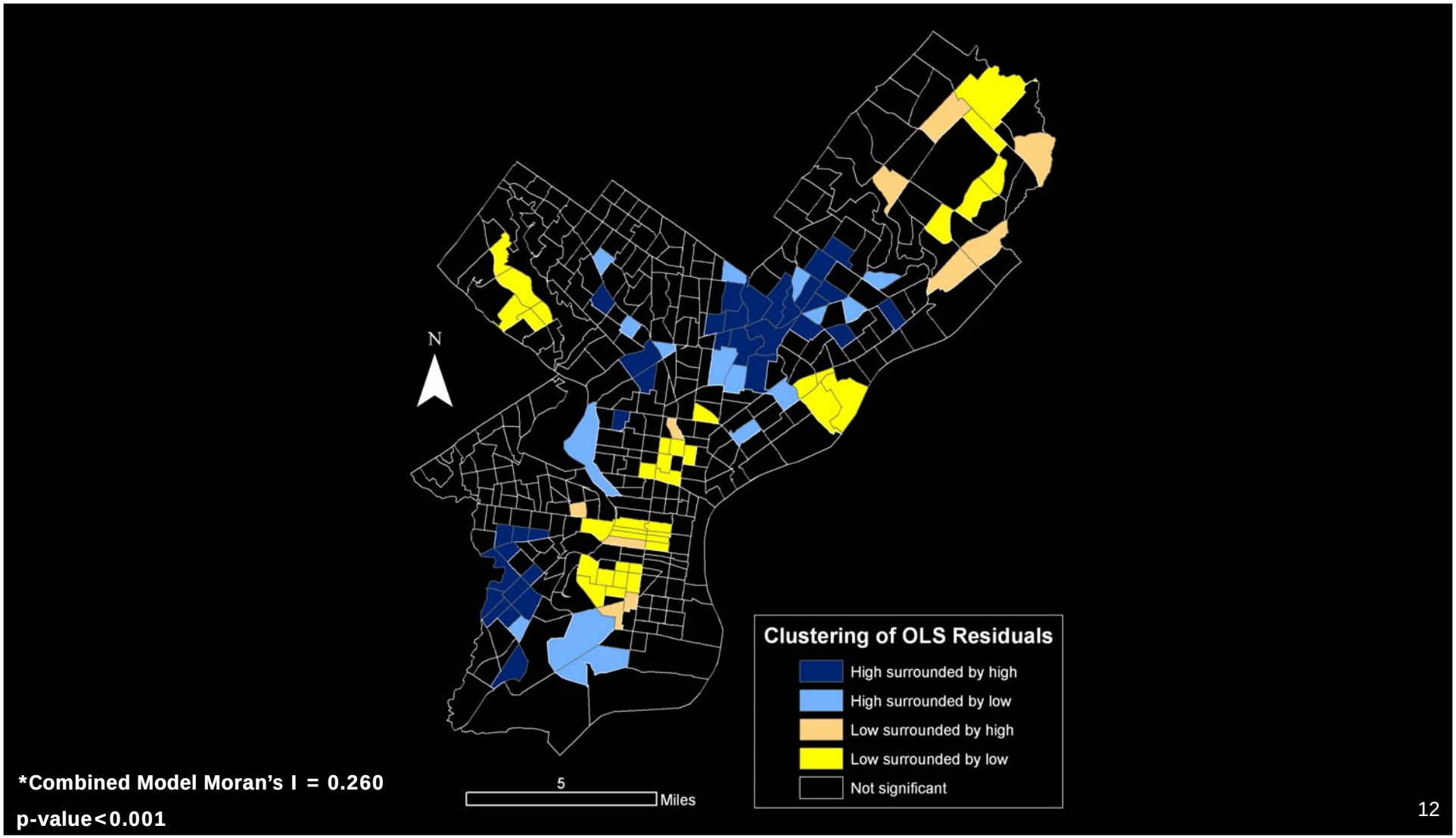

Parking Lots (N = 66)


Subway Stations (N = 51)

Regression Analyses



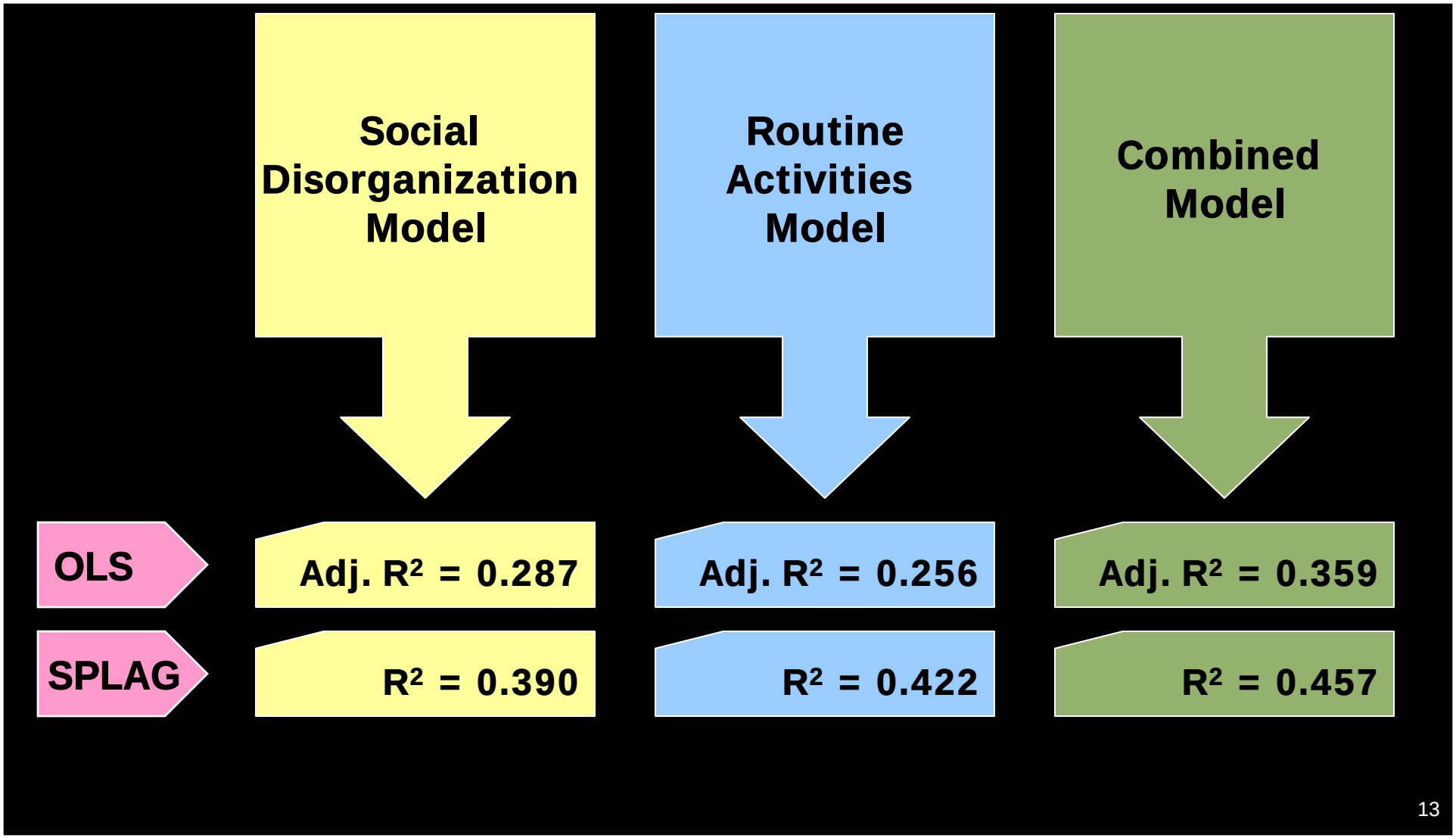
LISA Analysis of the OLS Residuals*



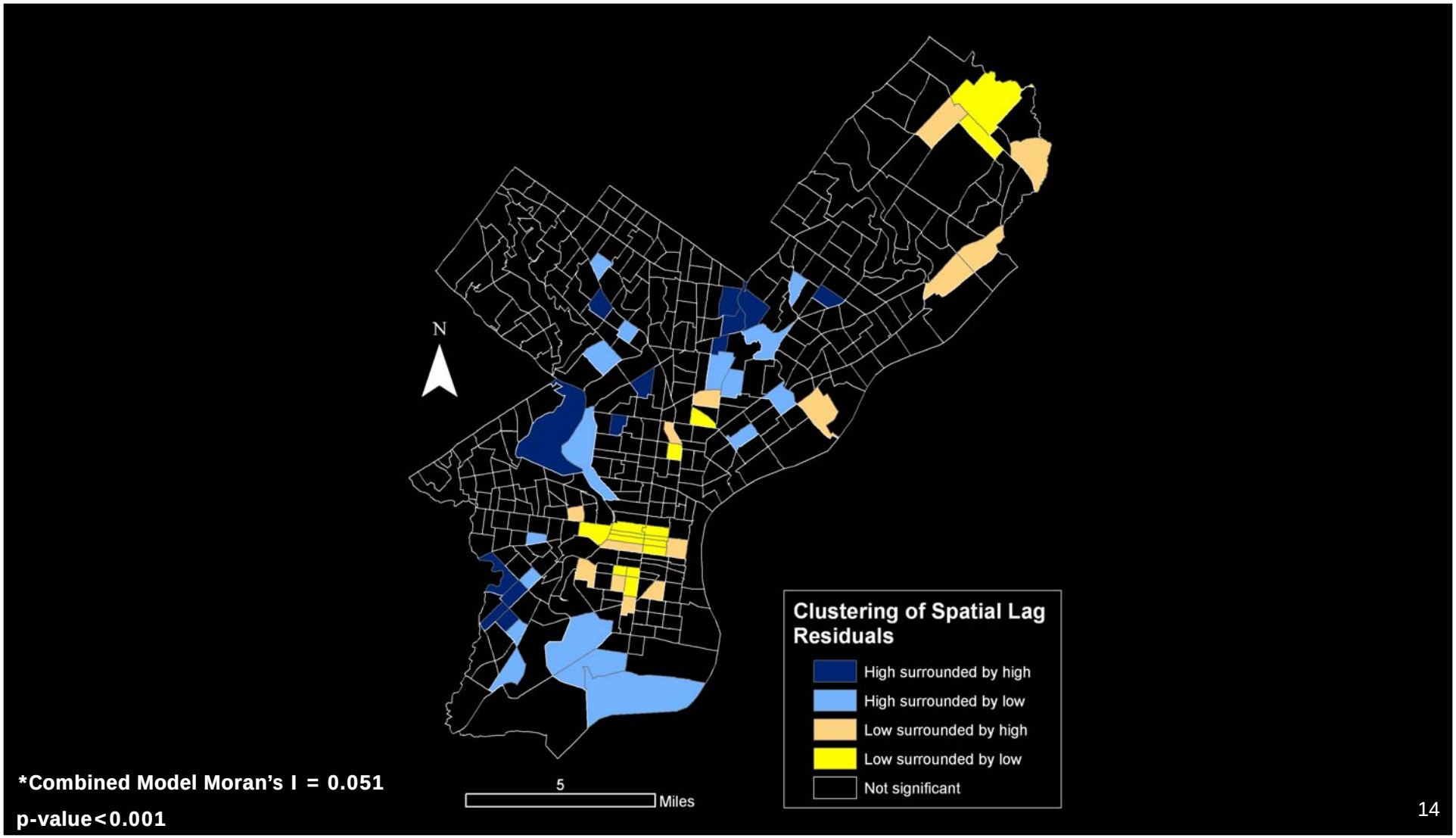
***Combined Model Moran's I = 0.260**

p-value<0.001

Regression Analyses



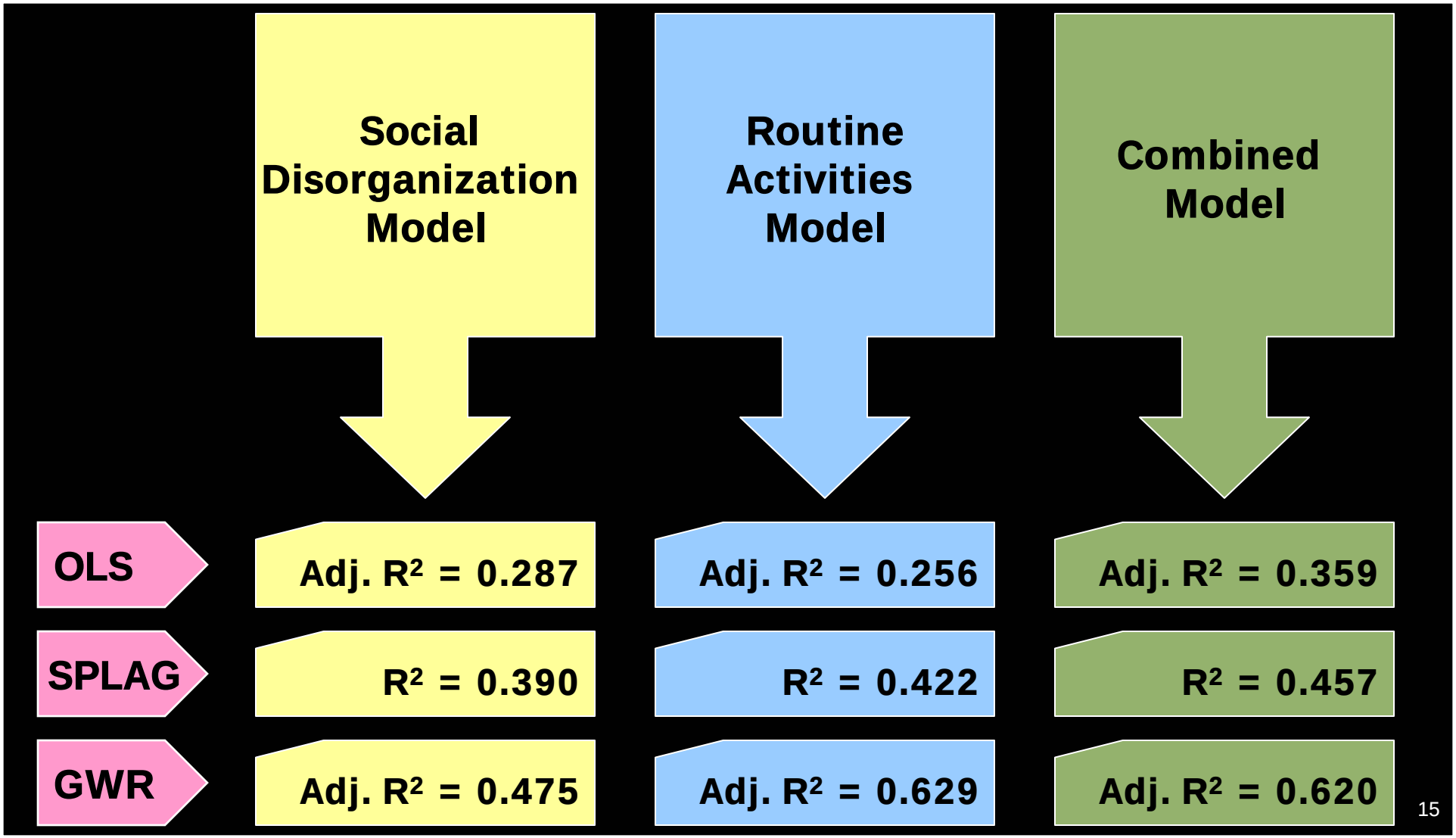
LISA Analysis of Spatial Lag Residuals*



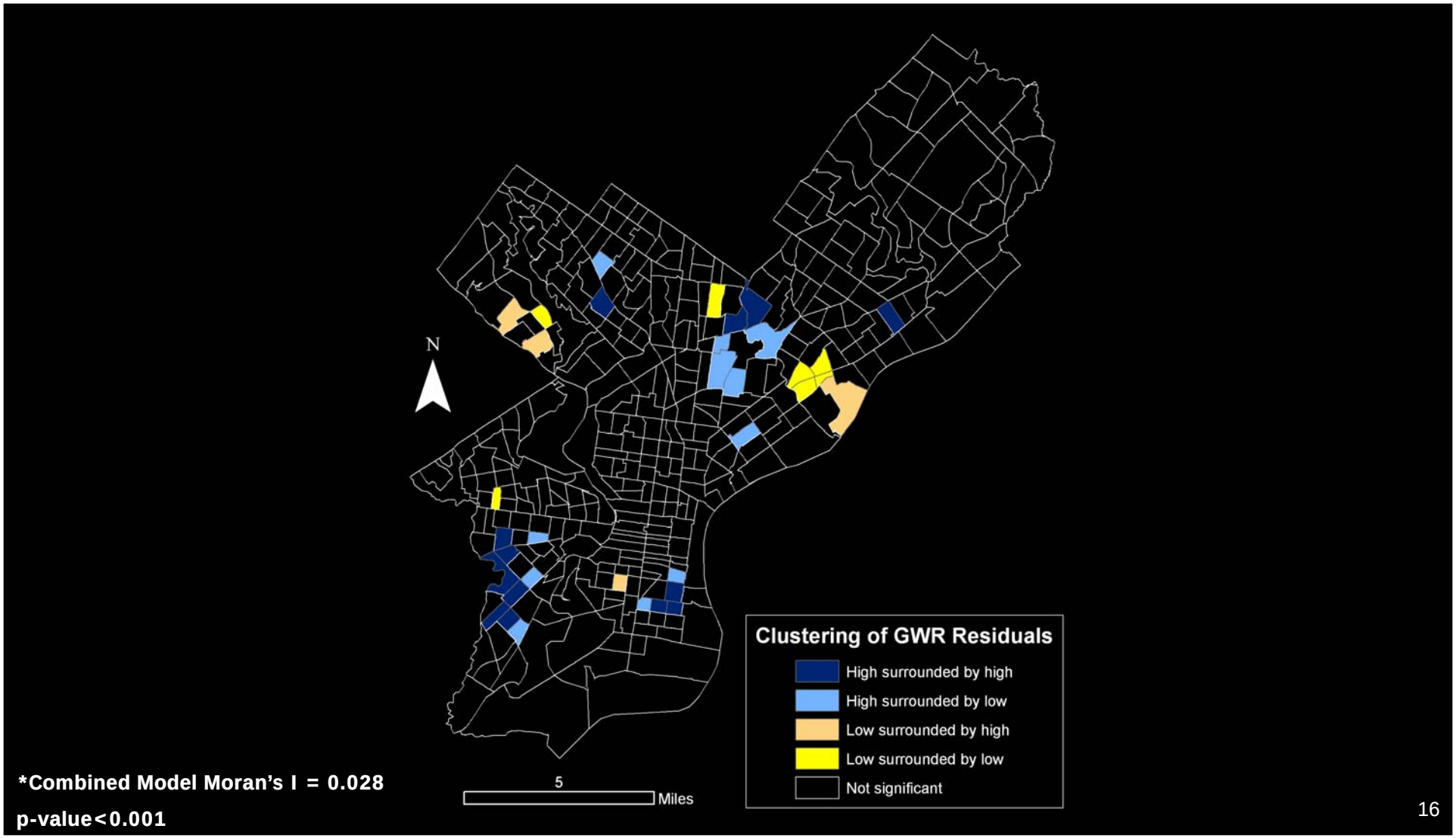
***Combined Model Moran's I = 0.051**

p-value<0.001

Regression Analyses



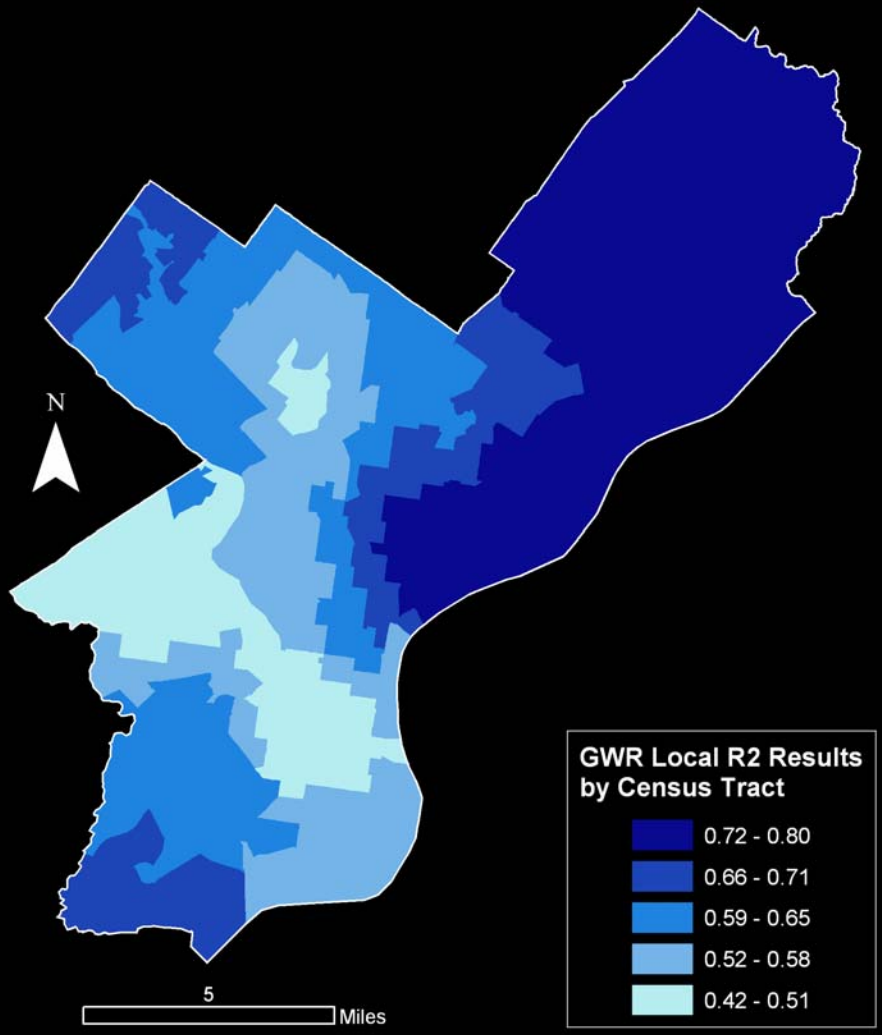
LISA Analysis of GWR Residuals*



***Combined Model Moran's I = 0.028**

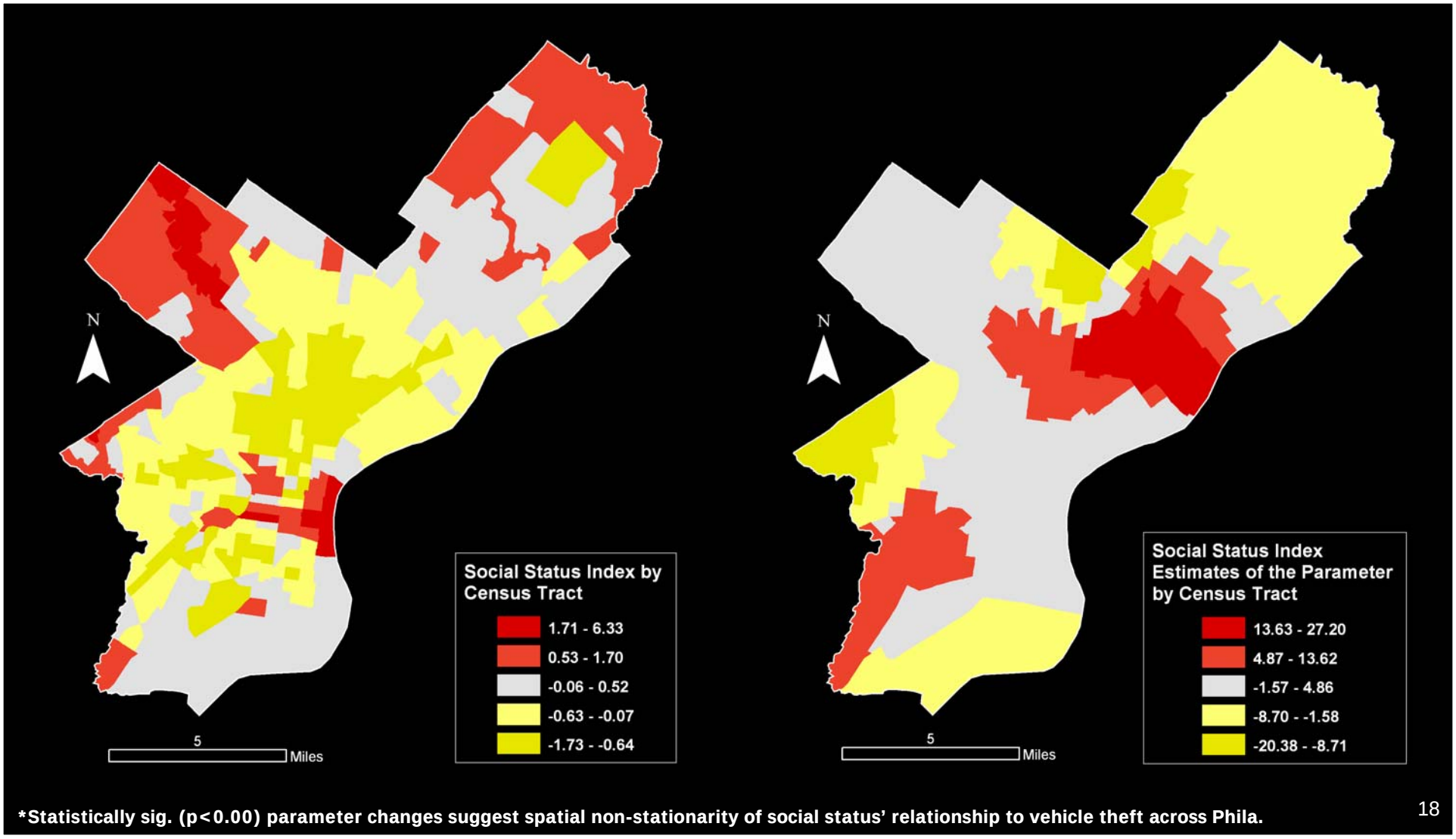
p-value<0.001

Vehicle Theft as a Non-Stationary Spatial Process*



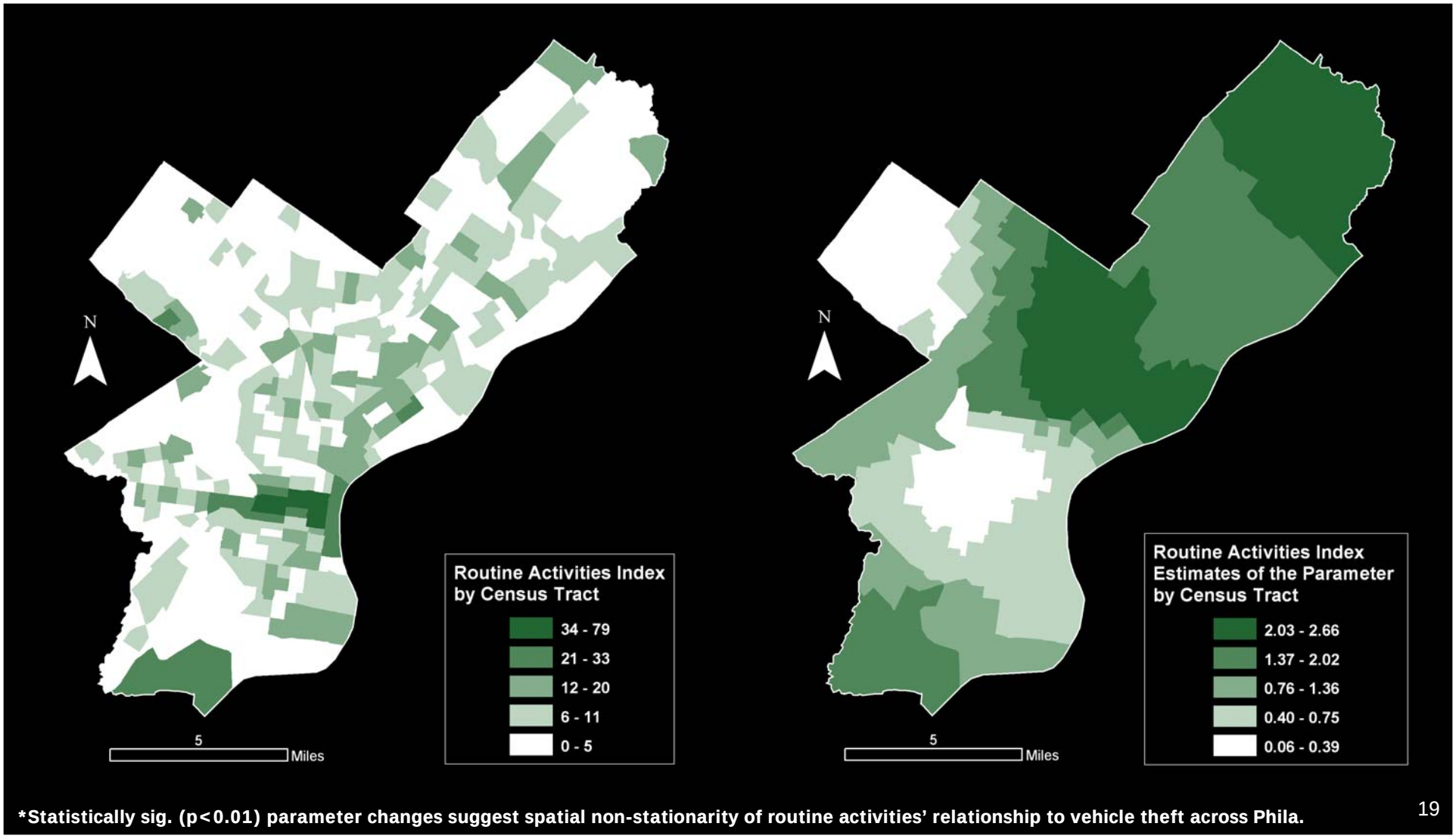
***Between 42% and 80% of the variance of the vehicle theft in Census Tracts is explained by the local model.**

Social Status as a Non-Stationary Spatial Process*



*Statistically sig. ($p < 0.00$) parameter changes suggest spatial non-stationarity of social status' relationship to vehicle theft across Phila.

RAT Nodes as a Non-Stationary Spatial Process*



***Statistically sig. ($p < 0.01$) parameter changes suggest spatial non-stationarity of routine activities' relationship to vehicle theft across Phila.**

Implications for Policy, Research, Theory

- Policy
  - Strategic crime prevention
    - Police deployment / investigations
    - Weak guardianship / ample opportunities
- Research
  - OLS/Spatial Lag/GWR analytic techniques and their results
  - Spatial non-uniformity of offenses, explanations, interventions
  - Recent population and routine activities changes in Philadelphia
- Theory
  - Combining/integrating theory for spatial analysis

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Combined Model Results (OLS)

Appendix

Adjusted $R^2 = 0.359$

Variable	Coefficient	Std. Error	T	Probability
CONSTANT	-2.75	3.64	-0.76	0.45
RAT	0.73	0.11	6.55	0.00
HETERO	24.49	4.25	5.76	0.00
STABILITY	0.16	0.05	2.97	0.00
STATUS	-4.42	1.60	-2.77	0.01
FAMILY	3.05	1.98	1.54	0.12
POPDEN	17344.12	2770.77	6.26	0.00
DISTANCE	1.38 e-004	6.86 e-005	2.01	0.05

Combined Model Results (Spatial Lag)

Appendix

$R^2 = 0.457$

Variable	Coefficient	Std. Error	T	Probability
W_MV_THEFT	0.41	0.06	7.05	0.00
CONSTANT	-11.11	3.46	-3.21	0.00
RAT	0.70	0.10	6.71	0.00
HETERO	17.65	3.99	4.42	0.00
STABILITY	0.12	0.05	2.45	0.01
STATUS	-2.59	1.48	-1.74	0.08
FAMILY	2.19	1.82	1.20	0.23
POPDEN	14760.69	2619.53	5.63	0.00
DISTANCE	1.65 e-004	6.30 e-005	2.62	0.01

Combined Model Results (GWR)

Appendix

Adj. R^2 = 0.620

Variable	Minimum	Maximum	Probability*
Intercept	-60.42	22.81	0.07
RAT	0.06	2.66	0.01
HETERO	-14.95	67.51	0.22
STABILITY	-0.28	0.99	0.18
STATUS	-20.38	27.20	0.00
FAMILY	-15.74	13.67	0.17
POPDEN	-4435.37	47637.78	0.00
DISTANCE	-9.93 e-004	3.33 e-003	0.00

*The probability of spatial non-stationarity of the parameter